

# Ergonomics

An international journal of research and practice  
in human factors and ergonomics

**Volume 30**

**1987**

The official publication of the  
Ergonomics Society and International Ergonomics Association  
in association with the Human Factors Association of  
Canada/Association Canadienne d'Ergonomie

*Taylor & Francis*

London • New York • Philadelphia

---

# Ergonomics

---

## *Editors*

**R. Goldsmith** (*General*), The Manor House, Gaulby, Leicestershire LE7 9BE, UK

**P. J. Barber** (*Psychology*), Department of Psychology, Birkbeck College, University of London, Malet Street, London WC1E 7HX, UK

**J. M. Patrick** (*Physiology*), Department of Physiology and Pharmacology, University Medical School, Nottingham NG7 2UH, UK

**C. O'Brien** (*Applications*), Department of Production Engineering and Production Management, University of Nottingham NG7 2RD, UK

## *News Editor*

**Mr G. Allison**, HUSAT Research Centre, The Elms, Elms Grove, Loughborough LE11 1RG, UK

## *Book Reviews Editor*

**H. C. W. Stockbridge**, Room 430, SP(N), A.B.S., Old Admiralty Building, Spring Gardens, London SW1A 2BE, UK

## CONTENTS OF VOLUME 30

### NUMBER 1—JANUARY 1987

Page	
1	This month. Happy Birthday to ...
3	Ergonomics of human relations. A. T. Welford.
9	Home thoughts from abroad. H. G. Mauler.
13	Burgeoning issues in ergonomics, 1975-1980. I. D. Brown.
19	Effects of induced alkalosis on physical work capacity during arm and leg exercise. R. J. Robertson, J. E. Falkel, A. L. Drash, A. M. Swank, K. F. Metz, S. A. Spungen and J. R. LeBoeuf.
33	Occupational musculoskeletal disorders of visual artists. A questionnaire and video analysis. W. S. Chang, F. J. Bejjani, D. Chyan and M. Bellegarde.
47	Spinal shrinkage in females: circadian variation and the effects of circuit weight-training. J. Wilby, K. Linge, T. Reilly and J. D. G. Troup.
55	The metabolic cost of various occupational exposures. M. Magnusson, M. Pope, V. Lindell, M. Svensson and G. Andersson.
61	Shifts, duration of work and accident risk of bus drivers. M. L. I. Pokorny, D. H. J. Blom and P. van Leeuwen.
89	Truncal stress measurement during manual handling. J. L. Dales, E. B. Macdonald and J. A. D. Anderson.
103	The effect of bending and rotation of the trunk on the intra-abdominal pressure and the erector spinae muscle when lifting while sitting. H. Boudrif and B. T. Davies.
111	Memory and menstrual cycle. L. R. Hartley, D. Lyons and M. Dunne.
121	The immediate effects of strenuous exercise on free-recall memory. P. D. Tomporowski, N. R. Ellis and R. Stephens.
131	Ergonomics news and information.
147	Japanese summaries.

### NUMBER 2—FEBRUARY 1987

151	Second International Conference on Musculoskeletal Injuries in the Workplace. Introduction. P. L. Ferrara and M. C. Nordin.
	Section 1. Plenary session: Prevention—who is responsible?
159	Message from WHO Director General, Halfdan T. Mahler, MD, and greetings from host region of WHO.
165	Summary of 1984 conference. M. Nordin.
169	Aims of the Conference—a summary. V. H. Frankel.
173	The importance of accident and injury prevention. C. J. Romer.
181	National prevention of musculoskeletal workplace injury: Denmark—a summary. O. Svane.

Page	
185	High-tech transference: overcoming obstacles in the application of knowledge. S. Penchas.
193	Responsibility and perspectives in the prevention of musculoskeletal work injuries and accidents—a summary. A. Rebaza-Flores.
199	Good health is not for sale. M. T. Stamper.
207	The dual responsibility: the worker at risk and the workplace as a risk—a summary. B. Svedberg.
213	Injuries as a preventable disease: the control of occupational injuries from the medical and public health perspective. G. S. Smith.
221	Prevention—a government perspective. R. M. Nelson.
227	Prevention, an institutional perspective: hospital/medical centres—a summary. H. Machaveri.
231	Ethical behaviour for the prevention of injuries in the workplace. Mgr. F. Angelini.
 Section 2. The worker at risk.	
241	Approaches to preplacement testing and selection of workers. S. H. Snook.
249	Preplacement worker testing and selection considerations. S. J. Bigos and M. C. Battie.
253	Replacement testing and selection of workers: the industry prospective. M. H. Stewart.
259	Trunk extensor endurance: determination and relation to low-back trouble. K. Jørgensen and T. Nicolaisen.
269	Individual risk factors of the back among applicants to a nursing school. G. Cedercreutz, T. Videman, S. Tola and S. Asp.
273	Work technique and its consequences for musculoskeletal disorders. Å. Kilbom and J. Persson.
281	Neck-shoulder loading characteristics and work technique. E. Melin.
287	Wellness and stress management programmes—a critical evaluation. J. Cullen and C. G. Sandberg.
295	The healthy back, its environment and characteristics: a pilot study. G. Hultman.
299	Manual materials handling: a survey of risks, and the selection and training of workers in Singapore. Tan Kia Tang.
305	Worker's education. T. Luopajarvi.
313	Management of housekeeping by feedback. J. Saari.
 Section 3. The workplace as risk.	
321	Occupational biomechanics—a basis for workplace design to prevent musculoskeletal injuries. D. B. Chaffin.
331	Worker training: the fallacy of a single, correct lifting technique. M. Parnianpour, F. J. Bejjani and L. Pavlidis.
335	Musculoskeletal injuries among bus drivers due to motor vehicle accidents and hazardous environmental conditions. D. Barak and L. Djerassi.

## CONTENTS OF VOLUME 30

Page	
343	Modification of work organization. L. Wallin.
351	The biomechanical basis for early care programmes. M. H. Pope.
359	Work organization and low back pain in nursing personnel. M. L. Skovron, M. N. Mulvihill, R. C. Sterling, M. Nordin, G. Tougas, M. Gallagher and E. J. Speedling.
367	Management involvement—a key element in preventing musculoskeletal problems in visual display unit users in Australia. S. A. Rowe.
373	Injuries and the 'poor' worker. D. Mohan.
379	Prevention of accidents and injuries in developing countries. S. E. Asogwa.
387	Prevention of accidents and injuries in Brazil. D. P. Nogueira.
Section 4. Global prevention of musculoskeletal injuries.	
397	Workplace injuries in the developing countries. H. Shahnavaz.
405	The impact and feasibility of international/national standards in the prevention of musculoskeletal injuries in developing countries. S. M. Veturi, B. K. Lakshmi, A. K. Ganguli and A. K. Chakrabarti.
411	Prevention of musculoskeletal injuries in the workplace. National approaches to safety standards: Great Britain. F. C. Edwards.
419	Ergonomic guidelines for the prevention of low back pain at the workplace. J. Dul and V. H. Hildebrandt.
431	Implementation programme of the Swedish ordinance concerning work postures and working movements. B. Nilsson, M. Bjurvald and K. Stjernberg.
Section 5. Early care programmes.	
439	Cooperation in professional support—the human sciences in industry. P. A. Van Wely.
449	Modification of work organization. M. Pope.
457	Prevention of reinjury. W. E. Fordyce.
Section 6. Closing addresses.	
465	Summary. B. Sankaran.
469	In conclusion. J. E. Asvall.
473	International Ergonomics Association news and information.
NUMBER 3—MARCH 1987	
489	Editorial.
491	The Ergonomics Society. The Society's Lecture 1987. The use of models in human-computer interface design. R. C. Williges.
503	Noise and verbal or spatial solutions of Rubik's cube. L. R. Hartley, B. Boultwood and M. Dunne.
511	Information integration and the object display. An interaction of task demands and display superiority. C. M. Carswell and C. D. Wickens.

## CONTENTS OF VOLUME 30

Page	
529	Modelling of maximum acceptable load of lifting by physical factors. B. C. Jiang and M. M. Ayoub.
539	The effects of load knowledge on stresses at the lower back during lifting. P. Patterson, J. Congleton, R. Koppa and R. D. Huchingson.
551	Trunk loading and expectation. W. S. Marras, S. L. Rangarajulu and S. A. Lavender.
563	Evaluation of metabolism from heart rate in industrial work. R. Nielsen and J.-P. Meyer.
573	The prevalence and causation of tennis elbow (lateral humeral epicondylitis) in a population of workers in an engineering industry. L. Dimberg.
581	Objective evaluation of eye strain using measurements of accommodative oscillation. T. Iwasaki and S. Kurimoto.
589	Ergonomics news and information.
603	Book reviews.
Our contemporaries:	
607	Zeitschrift für Arbeitswissenschaft. Abstracts of papers.
610	Japanese Journal of Ergonomics. Abstracts of papers.

### NUMBER 4—APRIL 1987

611	Editorial.
613	Whole-body vibration and visual performance: an examination of spatial filtering and time-dependency. M. J. Moseley and M. J. Griffin.
627	The use of a non-motorized treadmill for analysing sprint performance. H. K. A. Lakomy.
639	Continuous measurements of spine movements in normal working situations over periods of 8 hours or more. C. J. Snijders, M. P. J. M. van Riel and M. Nordin.
655	Colour-layering and the performance of the topographic map user. M. G. Eley.
665	Reporting words from the eye or the ear: to write or to speak? N. Morris and D. M. Jones.
675	Sex difference in muscular strength in equally-trained men and women. P. Bishop, K. Cureton and M. Collins.
689	Physical demands of work and health complaints among women working late in pregnancy. N. Cherry.
703	Individual characteristics of sitting behaviour. A. G. Fleischer, U. Rademacher and H.-J. Windberg.
711	Ergonomics news and information.
725	Book reviews.

### NUMBER 5—MAY 1987

731	Editorial.
733	Office health hazards: an annotated bibliography. A. Hedge.
773	Shift work in health care. L. H. M. Bosch and W. A. M. de Lange.

CONTENTS OF VOLUME 30

Page	
793	Sweat evaporation and thermal comfort wearing helicopter passenger immersion suits. I. M. Light, M. G. Gibson and A. I. Avery.
805	Relation between overhead work and complaints of pear and apple orchard workers. H. Sakakibara, M. Miyao, T. Kondo, S. Yamada, T. Nakagawa and F. Kobayashi.
817	Anthropometric characteristics of disabled and normal Indian men. A. Goswami, S. Ganguli and B. B. Chatterjee.
825	Estimation of maximum permissible loads to be carried by Indians of different ages. A. Samanta, S. R. Datta, B. N. Roy, A. Chatterjee and P. K. Mukherjee.
833	Power hand tool vibration effects on grip exertions. R. G. Radwin, T. J. Armstrong and D. B. Chaffin.
857	International Ergonomics Association news and information.
871	Book reviews.

Our contemporaries:

879	Ergonomija. Abstracts of papers.
883	Ergonomia. Abstracts of papers.
886	Zeitschrift für Arbeitswissenschaft. Abstracts of papers.
889	Le Travail Humain. Contents.

NUMBER 6—JUNE 1987

891	Editorial.
893	Female gait patterns: The influence of footwear. R. W. Soames and A. A. Evans.
901	Psychophysical lifting capabilities for overreach heights. A. Mital and F. Aghazadeh.
911	Generation of muscle tension additional to postural muscle load. R. H. Westgaard and R. Bjørklund.
925	The legibility and readability of a visual display unit at threshold. P. Kember and D. Varley.
933	Experimental investigation of psychophysiological stress-reactions induced by different system response times in human-computer interaction. W. Kuhmann, W. Boucsein, F. Schaefer and J. Alexander.
945	Effects of different types of physical activity on the performance of perceptual tasks in peripheral and central vision and coincident timing. M. Fleury and C. Bard.
959	Multidimensional scaling as a method for assessing internal conceptual models of inspection tasks. B. G. Coury.
975	A reanalysis of spinal motion during vibration. J. Sandover and H. Dupuis.
987	Ergonomics news and information.
1003	Book reviews.

Page	
	<b>NUMBER 7—JULY 1987</b>
1011	Sections, search and serendipity.
1013	Lumbo-sacral loads and selected muscle activity while turning patients in bed. M. Gagnon, A. Chehade, F. Kemp and M. Lortie.
1033	Influence of back angle on the quality of sleep in seats. A. N. Nicholson and B. M. Stone.
1043	Determination of clothing microenvironment volume. P. J. Sullivan, I. B. Mekjavić and N. Kakitsuba.
1053	Ventilation index of helicopter pilot suits. P. J. Sullivan, I. B. Mekjavić and N. Kakitsuba.
1063	A comparison of voice and multifunction controls: logic design is the key. J. M. Reising and D. G. Curry.
1079	Electromyographic analysis of a postal sorting task. J. P. De Groot.
1089	Anthropometric study of Egyptian woman. A. W. Moustafa, B. T. Davies, M. S. Darwich and M. A. Ibraheem.
1099	Exposure to ergonomic stressors in the garment industry: application and critique of job-site work analysis methods. L. Punnett and W. M. Keyserling.
1117	Ergonomics news and information.
	Our contemporaries:
1131	Le Travail Humain. Contents.
1132	Zeitschrift für Arbeitswissenschaft. Abstracts of papers.
	<b>NUMBER 8—AUGUST 1987</b>
1135	Brief but to the point.
1137	Patterns of differences between the maximum weights of lift acceptable to experienced and inexperienced materials handlers. A. Mital.
1149	Ankle angle effects on endurance time, median frequency and mean power of gastrocnemius EMG power spectrum: a comparison between individual and group analysis. P. C. Matthijsse, K. M. M. Hendrich, W. H. Rijnsburger, R. D. Woittiez and P. A. Huijing.
1161	Directional localization in high ambient noise with and without the use of hearing protectors. D. H. Mershon and L.-J. Lin.
1175	Self-paced work in sleep deprived subjects. W. S. Myles and T. T. Romet.
1185	Noise, unattended speech and short-term memory. P. Salamé and A. Baddeley.
1195	A method for estimating physical working capacity at the fatigue threshold ( $PWC_{FT}$ ). H. A. DeVries, M. W. Tichy, T. J. Housh, K. D. Smyth, A. M. Tichy and D. J. Housh.
1205	International Ergonomics Association news and information.
1219	Book reviews.

## CONTENTS OF VOLUME 30

Page

**NUMBER 9—SEPTEMBER 1987****Special Issue: Irregular and Abnormal Hours of Work**

1227 Editorial.

1229 Sleeping on the job: the use of anecdotes for recording rare but serious events. A. A. I. Wedderburn.

1235 Axillary temperature: a circadian marker rhythm for shift workers. Y. Motohashi, A. Reinberg, F. Levi, J. Nougier, O. Benoit, J. Foret and P. Bourdeleau.

1249 Optimization of shift work: psychological contributions. R. Moog.

1261 The role of naps in alleviating sleepiness during an irregular sleep-wake schedule. D. S. Minors and J. M. Waterhouse.

1275 The influence of irregularity of rest and activity on performance: a model based on time since sleep and time of day. M. B. Spencer.

1287 The impact of abnormal hours of work on various modes of information processing: a process model on human costs of performance. A. H. G. de Vries-Griever and Th. F. Meijman.

1301 The adaptation of night nurses to different work schedules. P. Verhaegen, R. Cober, M. De Smedt, J. Dirkx, J. Kerstens, D. Ryvers and P. Van Daele.

1311 A change from weekly to quicker shift rotations: a field study of discontinuous three-shift workers. P. Knauth and E. Kiesswetter.

1323 Lorry driver's time habits in work and their involvement in traffic accidents. P. Hamelin.

1335 Sleep at sea: a diary study of the effects of unattended machinery space watch duty. L. Torsvall, K. Castenfors, T. Åkerstedt and J. Fröberg.

1341 A shipboard study of a four-crew rotating watchkeeping system. W. P. Colquhoun, K. J. Watson and D. S. Gordon.

1353 Night shift paralysis in air traffic control officers. S. Folkard and R. Condon.

1365 Sleep in pilots flying short-haul commercial schedules. P. H. Gander and R. C. Graeber.

1379 Some effects of jet-lag and their alleviation by melatonin. J. Arendt, M. Aldhous, J. English, V. Marks, J. H. Arendt, M. Marks and S. Folkard.

1395 Desynchronization and internal dissociation in aircrew. A. Samel and H. M. Wegmann.

1405 Ergonomics news and information.

**NUMBER 10—OCTOBER 1987**

1441 Editorial.

1413 The effects of load placement on the EMG activity of the low back muscles during load carrying by men and women. T. M. Cook and D. A. Neumann.

1425 Postural adjustments while standing with two types of loaded backpack. D. Bloom and A. P. Woodhull-McNeal.

1431 Effects of moderate cold on performance of psychomotor and cognitive tasks. A. Enander.

1447 Context and the interpretation of quantifiers of frequency. S. E. Newstead and J. M. Collis.

CONTENTS OF VOLUME 30

Page  
1463 Fear and performance in novice parachutists. C. Idzikowski and A. Baddeley.  
1475 The effects of hypoxia on reaction time and movement time components of a perceptual-motor task. B. Fowler, M. Taylor and G. Porlier.  
1487 Ergonomics news and information.  
1499 Japanese summaries.

NUMBER 11—NOVEMBER 1987  
1513 This month. Remember, Remember...  
1515 Mechanical work and energy transfers while turning patients in bed. M. Gagnon, F. Akre, A. Chehade, F. Kemp and M. Lortie.  
1531 Task-related risk factors for spinal injury: validation of a self-administered questionnaire on hospital employees. M. Rossignol and J. Baetz.  
1541 A worksite method for shoulder muscle fatigue measurements using EMG, test contractions and zero crossing technique. G. M. Hägg, J. Suurküla and M. Liew.  
1553 Relations between shoulder/neck disorders and EMG zero crossing shifts in female assembly workers using the test contraction method. J. Suurküla and G. M. Hägg.  
1565 Reassessment of the role of intra-abdominal pressure in spinal compression. S. M. McGill and R. W. Norman.  
1589 Physiological responses of fire fighters to workload and thermal stress. B. Sköldström.  
1599 A comparison of models for predicting human response to hot and cold environments. R. A. Haslam and K. C. Parsons.  
1615 Ergonomics news and information.

Our contemporaries:  
1625 Zeitschrift für Arbeitswissenschaft. Abstracts of papers.

NUMBER 12—DECEMBER 1987  
1629 Editorial.  
1631 Ergonomics in China: a historical perspective and some recent development. N. Ong and H. Shahnavaz.  
1645 Issues in software ergonomics: user interface design and Chinese computing input methodology. A. B. H. Kang and L. H. Boon.  
1655 A device for three-dimensional registration of human movement. B. Samuelson, M. Wangenheim and H. Wos.  
1671 Foot-ground forces on sloping ground when lifting. Y. Zhao, S. K. Upadhyaya and M. S. Kaminaka.  
1689 Thermal sensation of the body as influenced by the thermal microclimate in a face mask. R. Nielsen, L. G. Berglund, A. R. Gwosdow and A. B. DuBois.  
1705 The clarity and comfort of printed text. A. J. Wilkins and M. I. Nimmo-Smith.  
1721 Ergonomics news and information.  
1733 Editors' acknowledgment.  
1735 Index of authors (with the titles of the papers).